WHAT IS CLAIMED IS:

1. A method for deploying forward error correction (FEC) in transmission networks, comprising the steps of:

FEC encoding a signal in a first domain;

inverse multiplexing the first domain signal into N segments in the first domain;

converting the N segments in the first domain into N segments in a second domain; and

combining the second domain N segments into a combined signal in the second domain for transport on a transmission medium.

2. The method of claim 1 wherein the first domain signal is at a first baud rate and the first and second domain signal N segments are at second baud rate.

3. The method of claim 2 wherein the first baud rate is higher than the second baud rate.

4. The method of claim 2 wherein the second baud rate is higher than the first baud rate.

5. The method of claim 2 wherein the first and second baud rates are the same.

6. The method of claim 2 wherein the first and second baud rates are in Kbps, Mbps, Gbps or Tbps.

7. The method of claim 1 wherein the where the step of converting comprises a monolithic photonic integrated circuit (PIC) having integrated N signal channels for converting a respective signal segment in the first domain into a signal segment in the second domain and multiplexing the N channel signal segments to form the combined signal.

8. The method of claim 1 wherein the first domain is an electrical domain and the second domain is an optical domain.

9. The method of claim 1 wherein the first domain is an electrical domain and the second domain is an electrical domain.

10. The method of claim 1 wherein the first domain is an optical domain and the second domain is an electrical domain.

11. The method of claim 1 comprising the further steps of:

providing a plurality of M signals multiplexed in the first domain;

FEC encoding the multiplexed M signals in a first domain;

inverse multiplexing the first domain signals into separate N signals in the first domain; and

converting the first domain N signals into N signals in a second domain; and

combining the second domain N signals into a combined signal for transport on a transmission medium.

12. The method of claim 11 wherein the first domain M signals are at a first baud rate and the N and combined signals are at second baud rate.

13. The method of claim 12 wherein the first baud rate is higher than the second baud rate.

14. The method of claim 12 wherein the second baud rate is higher than the first baud rate.

15. The method of claim 12 wherein the first and second baud rates are the same.

16. The method of claim 12 wherein the first and second baud rates are in Kbps, Mbps, Gbps or Tbps.

17. The method of claim 11 wherein the where the step of converting comprises a monolithic photonic integrated circuit (PIC) having integrated N signal channels for converting a respective N signal in the first domain into a N signal in the second domain and multiplexing the N channel signals to form the combined signal.

18. The method of claim 11 wherein the first domain is an electrical domain and the second domain is an optical domain.

19. The method of claim 11 wherein the first domain is an electrical domain and the second domain is an electrical domain.

20. The method of claim 11 wherein the first domain is an optical domain and the second domain is an electrical domain.

21. The method of claim 11 wherein the first domain is an optical domain and the second domain is an optical domain.

22. The method of claim 1 wherein the transmission medium is an electrical medium or an optical medium depending upon, respectively, whether the second domain is an electrical domain or an optical domain.

23. A method for deploying forward error correction (FEC) in transmission networks, comprising the steps of:

FEC encoding a first multiplexed signal comprising M signals in a first domain at a first baud rate;

inverse multiplexing the encoded multiplexed signal of the first domain into N signals in the first domain at a second baud rate;

converting the first domain N signals into N signals in a second domain; and

combining the second domain N signals at the second baud rate into a combined signal for transport on a transmission medium.

24. The method of claim 23 wherein the first baud rate is higher than the second baud rate.

25. The method of claim 23 wherein the second baud rate is higher than the first baud rate.

26. The method of claim 23 wherein the first and second baud rates are the same.

27. The method of claim 23 wherein the first and second baud rates are in Kbps, Mbps, Gbps or Tbps.

28. The method of claim 23 wherein the where the step of converting comprises a monolithic photonic integrated circuit (PIC) having integrated N signal channels for converting a respective N signal in the first domain into a N signal in the second domain and multiplexing the N channel signals to form the combined signal.

29. The method of claim 23 wherein the first domain is an electrical domain and the second domain is an optical domain.

30. The method of claim 23 wherein the first domain is an electrical domain and the second domain is an electrical domain.

31. The method of claim 23 wherein the first domain is an optical domain and the second domain is an electrical domain.

32. The method of claim 23 wherein the first domain is an optical domain and the second domain is an optical domain.

33. The method of claim 23 wherein the transmission medium is an electrical medium or an optical medium depending upon, respectively, whether the second domain is an electrical domain or an optical domain.

34. A method for deploying forward error correction (FEC) in transmission networks, comprising the steps of:

decombining a FEC encoded combined signal in a second domain and received from a transmission medium into N segments in the second domain;

converting the N segments in the second domain into N segments in the first domain;

multiplexing the first domain N segments into a multiplexed M signal comprising M signals in the first domain; and

FEC decoding the first domain multiplexed M signal.

35. The method of claim 34 comprising the further step of demultiplexing the FEC decoded multiplexed M signal into a plurality of M signals in the first domain and forwarding the M signals to a respective data sink.

36. The method of claim 34 wherein the first domain signal is at a first baud rate and the first and second domain signal N segments are at second baud rate.

37. The method of claim 36 wherein the first baud rate is higher than the second baud rate.

38. The method of claim 36 wherein the second baud rate is higher than the first baud rate.

39. The method of claim 36 wherein the first and second baud rates are the same.

40. The method of claim 36 wherein the first and second baud rates are in Kbps, Mbps, Gbps or Tbps.

41. The method of claim 34 wherein the where the step of converting comprises a monolithic photonic integrated circuit (PIC) having integrated N signal channels for converting a respective signal segments in the first domain into signal segment a in the second domain and multiplexing the N channel signal segments to form the combined signal.

42. The method of claim 34 wherein the first domain is an electrical domain and the second domain is an optical domain.

43. The method of claim 34 wherein the first domain is an electrical domain and the second domain is an electrical domain.

44. The method of claim 34 wherein the first domain is an optical domain and the second domain is an optical domain.

45. The method of claim 34 comprising the further steps of:

providing a FEC encoded combined signal comprising a plurality of M signals combined in the second domain;

decombining the FEC encoded combined signal of M signals in the second domain into N signals in the second domain;

converting the N signals in the second domain into N signals in the first domain;

multiplexing the first domain N signals into a multiplexed M signal comprising the M signals in the first domain; and

FEC decoding the first domain multiplexed M signal.

46. The method of claim 45 comprising the further step of demultiplexing the FEC decoded multiplexed M signal into a plurality of M signals in the first domain and forwarding the M signals to respective data sinks.

47. The method of claim 45 wherein the first domain M signals are at a first baud rate and the N and FEC encoded combined signals are at second baud rate.

48. The method of claim 45 wherein the first baud rate is higher than the second baud rate.

49. The method of claim 45 wherein the second baud rate is higher than the first baud rate.

50. The method of claim 45 wherein the first and second baud rates are the same.

51. The method of claim 45 wherein the first and second baud rates are in Kbps, Mbps, Gbps or Tbps.

52. The method of claim 45 wherein the where the step of converting comprises a monolithic photonic integrated circuit (PIC) having integrated N channel signal channels for converting a respective N signal in the first domain into a N signal in the second domain and multiplexing the N channel signals to form the combined signal.

53. The method of claim 45 wherein the first domain is an electrical domain and the second domain is an optical domain.

54. The method of claim 45 wherein the first domain is an electrical domain and the second domain is an electrical domain.

55. The method of claim 45 wherein the first domain is an optical domain and the second domain is an electrical domain.

56. The method of claim 45 wherein the first domain is an optical domain and the second domain is an optical domain.

57. The method of claim 45 wherein the transmission medium is an electrical medium or an optical medium depending upon, respectively, whether the second domain is an electrical domain or an optical domain.

58. A method for deploying forward error correction (FEC) in transmission networks, comprising the steps of:

providing a FEC encoded combined signal comprising a plurality of M signals combined in a second domain at a second baud rate;

decombining the FEC encoded combined signal of M signals in the second domain into N signals in the second domain;

converting the N signals in the second domain into N signals in a first domain;

multiplexing the first domain N signals into a first domain multiplexed M signal of M signals at a second baud rate; and

FEC decoding the first domain multiplexed M signal.

59. The method of claim 58 comprising the further step of demultiplexing the FEC decoded multiplexed M signal into a plurality of M signals in the first domain and forwarding the M signals to respective data sinks.

60. The method of claim 58 wherein the first baud rate is higher than the second baud rate.

61. The method of claim 58 wherein the second baud rate is higher than the first baud rate.

62. The method of claim 58 wherein the first and second baud rates are the same.

63. The method of claim 58 wherein the first and second baud rates are in Kbps, Mbps, Gbps or Tbps.

64. The method of claim 58 wherein the where the step of converting comprises a monolithic photonic integrated circuit (PIC) having integrated N signal channels for converting a respective N signal in the first domain into a N signal in the second domain and multiplexing the N channel signals to form the combined signal.

65. The method of claim 58 wherein the first domain is an electrical domain and the second domain is an optical domain.

66. The method of claim 58 wherein the first domain is an electrical domain and the second domain is an electrical domain.

67. The method of claim 58 wherein the first domain is an optical domain and the second domain is an electrical domain.

68. The method of claim 58 wherein the first domain is an optical domain and the second domain is an optical domain.

69. The method of claim 58 wherein the transmission medium is an electrical medium or an optical medium depending upon, respectively, whether the second domain is an electrical domain or an optical domain.

70. A transmission network having a transmitter side and a receiver side, comprising:

said transmitter side comprising:

a data source for providing a multiplexed M signal of M signals in a first domain modulated at a first baud rate;

a FEC encoder for encoding the multiplexed M signal;

an inverse multiplexer for converting the encoded multiplexed M signal into N signal segments at a second baud rate in the first domain;

a converter for converting the N signal segments in the first domain into N signal segments of a second domain; and

a combiner for combining the N signal segments of a second domain into a combined signal in the second domain for transport on a transmission medium;

said receiver side comprising:

a decombiner for receiving said combined signal in the second domain from the transmission medium and decombing said combined signal into N segments in the second domain

a converter for converting the N segments in the second domain into N segments in the first domain;

a multiplexer for converting the first domain N segments at a first baud rate into a multiplexed M signal at a second baud rate comprising said first domain M signals each at the first baud rate; and

a FEC decoder for decoding the multiplexed M signal.

71. The transmission network of claim 70 wherein said data source comprises of a plurality of M data sources providing M signals at a first baud rate and a multiplexer to combine said M signals into said multiplexed M signal of M signals.

72. The transmission network of claim 70 further comprising a demultiplexer to receive said FEC decoded multiplexed M signal into a plurality of M signals each provided a respective data sink.

73. The transmission network of claim 70 wherein the first baud rate is higher than the second baud rate.

74. The transmission network of claim 70 wherein the second baud rate is higher than the first baud rate.

75. The transmission network of claim 70 wherein the first and second baud rates are the same.

76. The transmission network of claim 70 wherein the first and second baud rates are in Kbps, Mbps, Gbps or Tbps.

77. The transmission network of claim 70 wherein said converter on said transmitter side comprises a monolithic photonic integrated circuit (PIC) having N signal channels for converting a respective N signal segment in the first domain into a respective N signal segment in the second domain and multiplexing the N channel signal segments to form the combined signal.

78. The transmission network of claim 77 wherein said first domain comprises an electrical domain and said second domain comprises an optical domain; said monolithic photonic integrated circuit (PIC) comprises an array of N laser sources, an array of N optic-electric modulators and an optical combiner to combine N optical signal segments into said combined signal for transport on said transmission medium; said transmission medium comprising an optical fiber.

79. The transmission network of claim 78 wherein said laser sources comprise an array of DFB lasers or DBR lasers.

80. The transmission network of claim 78 wherein said electro-optic modulators comprise an array of electro-absorption modulators or Mach-Zehnder modulators.

81. The transmission network of claim 78 wherein said optical combiner comprises an arrayed waveguide grating (AWG) or an Echelle grating.

82. The transmission network of claim 70 wherein said converter on said receiver side comprises a monolithic photonic integrated circuit (PIC) comprising a demultiplexer for decombining the combined signal into N signal segments and converting a respective N signal segment in the second domain into a respective N signal segment in the first domain.

83. The transmission network of claim 82 wherein said first domain comprises an electrical domain and said second domain comprises an optical domain; said monolithic photonic integrated circuit (PIC) comprises an optical decombiner for decombing said combined signal into N optical signal segments and an array of photodetectors for each converting a respective optical signal segment into a respective electrical signal segment.

84. The transmission network of claim 82 wherein said decombiner comprises an arrayed waveguide grating (AWG) or an Echelle grating.

85. The transmission network of claim 82 wherein said array of photodetectors comprise an array of PIN photodiodes or an array of avalanche photodiodes.

86. The transmission network of claim 70 wherein the first domain is an electrical domain and the second domain is an optical domain.

87. The transmission network of claim 70 wherein the first domain is an electrical domain and the second domain is an electrical domain.

88. The transmission network of claim 70 wherein the first domain is an optical domain and the second domain is an electrical domain.

89. The transmission network of claim 70 wherein the first domain is an optical domain and the second domain is an optical domain.

90. The transmission network of claim 70 wherein said transmission medium is an electrical medium or an optical medium depending upon, respectively, whether the second domain is an electrical domain or an optical domain.

91. A transmission network having a transmitter side and a receiver side, comprising:

said transmitter side comprising:

a data source for providing a multiplexed M signal of M signals in a first domain modulated at a first baud rate;

a FEC encoder for encoding the multiplexed M signal;

an inverse multiplexer for converting the encoded multiplexed M signal into a plurality of N signals at a second baud rate in the first domain;

a converter for converting the N signals in the first domain into N signals in a second domain; and

a combiner for combining the N signals of the second domain into a combined signal in the second domain for transport on a transmission medium;

said receiver side comprising:

a decombiner for receiving said combined signal in the second domain from the transmission medium and decombing said combined signal into N signals in the second domain

a converter for converting the N signals in the second domain into N signals in the first domain;

a multiplexer for converting the first domain N signals at the second baud rate into a multiplexed M signal at a first baud rate comprising said first domain M signals each at the first baud rate; and

a FEC decoder for decoding the multiplexed M signal.

92. The transmission network of claim 91 wherein said data source comprises of a plurality of M data sources providing M signals at a first baud rate and a multiplexer to combine said M signals into said multiplexed M signal of M signals.

93. The transmission network of claim 91 further comprising a demultiplexer to receive said FEC decoded multiplexed M signal into a plurality of M signals each provided a respective data sink.

94. The transmission network of claim 91 wherein the first baud rate is higher than the second baud rate.

95. The transmission network of claim 91 wherein the second baud rate is higher than the first baud rate.

96. The transmission network of claim 91 wherein the first and second baud rates are the same.

97. The transmission network of claim 91 wherein the first and second baud rates are in Kbps, Mbps, Gbps or Tbps.

98. The transmission network of claim 91 wherein said converter on said transmitter side comprises a monolithic photonic integrated circuit (PIC) having N signal channels for converting a respective N signal in the first domain into a respective N signal in the second domain and multiplexing the N channel signals to form the combined signal.

99. The transmission network of claim 98 wherein said first domain comprises an electrical domain and said second domain comprises an optical domain; said monolithic photonic integrated circuit (PIC) comprises an array of N laser sources, an array of N optic-electric modulators and an optical combiner to combine N optical signals into said combined signal

for transport on said transmission medium; said transmission medium comprising an optical fiber.

100. The transmission network of claim 99 wherein said laser sources comprise an array of DFB lasers or DBR lasers.

101. The transmission network of claim 99 wherein said electro-optic modulators comprise an array of electro-absorption modulators or Mach-Zehnder modulators.

102. The transmission network of claim 99 wherein said optical combiner comprises an arrayed waveguide grating (AWG) or an Echelle grating.

103. The transmission network of claim 91 wherein said converter on said receiver side comprises a monolithic photonic integrated circuit (PIC) comprising a demultiplexer for decombining the combined signal into N signals and converting a respective N signal in the second domain into a respective N signal in the first domain.

104. The transmission network of claim 103 wherein said first domain comprises an electrical domain and said second domain comprises an optical domain; said monolithic photonic integrated circuit (PIC) comprises an optical decombiner for decombing said combined signal into N optical signals and an array of photodetectors for each converting a respective N optical signal into a respective electrical signal.

105. The transmission network of claim 104 wherein said decombiner comprises an arrayed waveguide grating (AWG) or an Echelle grating.

106. The transmission network of claim 104 wherein said array of photodetectors comprise an array of PIN photodiodes or an array of avalanche photodiodes.

107. The transmission network of claim 104 wherein the first domain is an electrical domain and the second domain is an optical domain.

108. The transmission network of claim 104 wherein the first domain is an electrical domain and the second domain is an electrical domain.

109. The transmission network of claim 104 wherein the first domain is an optical domain and the second domain is an electrical domain.

110. The transmission network of claim 104 wherein the first domain is an optical domain and the second domain is an optical domain.

111. The transmission network of claim 104 wherein said transmission medium is an electrical medium or an optical medium depending upon, respectively, whether the second domain is an electrical domain or an optical domain.